Rearing of catfish (*Clarias batrachus* Lin.) larvae with live and prepared feeds

A. Yasmin, M.F.A. Mollah* and G.S. Haylor

Department of Fisheries Biology & Genetics
Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

1University of Stirling, Scotland, UK

*Corresponding author

Abstract

Provision or live feed (Tubificid worms) attributed significantly better weight gain in the five days old *Clarias batrachus* larvae when reared for another 28 days compared to those fed mixed feed (live and artificial) and artificial feed only. Larvae fed mixed feed showed significantly better weight gain compared to those fed only artificial feed and the survival rate was similar to those fed only live feed. Both the weight gain and survival rate were the lowest for the larvae reared only on artificial feed.

Key words: *C. batrachus*, Larvae, Live feed

Introduction

In Bangladesh, *C. batrachus* is commonly known as 'magur' and is available in all types of freshwater habitats such as rivers, canals, beels, swamps and ponds. It attains maturity within the first year of life and spawns in both open and confined waters. The spawning period of *C. batrachus* is very short and distinct, and occurs once in a year during the month of July-August (Thakur 1987). It is highly popular fish and due to its good taste and easy digestibility it is often recommended as diets for the patients and as such it fetches high market price. *C. batrachus* is an omnivorous fish and can be stocked more densely than many other species. But its culture practices have not been standardized and the production is not sustainable. Inspite of the above suitability of the species, there are some problems for its intensive culture. The supply of fry from the natural sources is not sufficient and it is irregular also. However, use of pituitary extracts (Devaraj *et al.* 1972, Khan 1972, Rahmatullah *et al.* 1983), Prostaglandin F2 a (Tikare *et al.* 1983) and human chorionic gonadotropin (Mollah 1987 a, b) brought about considerable and dependable success in fry production of *C. batrachus*. But larval feed for successful rearing of fry exists as the main impediment for its intensive culture. Mollah and Nurullah (1988) successfully reared *C. batrachus* larvae with live feed (*Tubifex spp*). However, there remains several unavoidable problems associated with the availability and culture of
natural live feed organisms. Artificial feed, on the other hand can be manufactured on a large scale basis and used for the larval rearing of fish.

Formulation of quality fish feed from indigenous raw materials for *C. batrachus* fingerlings has been reported by Sanaullah *et al.* (1986). Some preliminary works on the formulation of artificial feed for *C. batrachus* larvae have been done by Alam and Mollah (1988). However, a suitable artificial diet to ensure better growth and higher survival of the larvae is yet to be developed.

In view of above facts, an experiment was conducted in order to get the preliminary idea as to how live feed, mixed feed and only artificial feed affect the growth and survival of *C. batrachus* larvae depending on which further research to wean them gradually from live to artificial one can be initiated.

**Materials and methods**

**Source of fry**

*C. batrachus* larvae used in the experiment were produced by induced breeding technique using human chorionic gonadotropin (HCG) at a dose of 21U g⁻¹ body wt. and 1 carp pituitary gland (PG) kg⁻¹ body wt. of female. Nine female and six male broods of *C. batrachus* were used for this experiment. Hatching completed by 30 hrs of fertilization. When the yolk sac was completely absorbed, the larvae were fed ground whole chicken egg mixed with semi-boiled water. The whole ground egg turned into fine particles when mixed with semi-boiled water and larvae fed it wistfully. The experiment was started with 5 days old larvae with average total length of 8.9 ± 0.99 mm and weight of 3.7 ± 1.15 mg.

**Plan of experiment**

The experiment was conducted in the Wet Laboratory of Fisheries Faculty, Bangladesh Agricultural University, Mymensingh. Thirty plastic bowls, each of 17-L capacity, were used for this experiment. Each bowl, however, contained 10-L of water to avoid jumping out of larvae. Each of the bowls was stocked with 40 *C. batrachus* larvae. The bowls were divided into three treatments i.e., (T₁, T₂ and T₃) for each treatment, 10 replications were used. All of the fry were fed two times (at 0600 hrs. and at 1800 hrs.) daily. The larvae of T₁ were fed live feed (chopped tubificid worms), while those of T₂ were fed both chopped tubificid worms and starter (Saudi Bangla Fish Feed Ltd., Bhaluka, Mymensingh) and T₃ starter only (Table 1). Water level of each bowl was controlled by an inlet and an outlet. Each of the bowls was cleaned once a day in the morning by siphoning out one third of the water with the dirt at the bottom before feeding. At this time the dead fry were removed, counted and recorded. During experimental period the water temperature ranged between 25.8°C and 27.5°C. Dissolved oxygen content ranged between 5.5 and 7 ppm and PH between 7.3
and 7.7 Deep well water stored in an overhead reserve tank was supplied in each of the bowls by perforated plastic pipe at the same rate of all the replicates.

Table 1. Proximate composition (%) of the experimental feeds

<table>
<thead>
<tr>
<th>Feed</th>
<th>Moisture</th>
<th>Protein</th>
<th>Fat</th>
<th>Fibre</th>
<th>Ash</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Starter 1</td>
<td>12</td>
<td>39</td>
<td>3</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>**Tubificid worms</td>
<td></td>
<td>72.2</td>
<td>22.2</td>
<td></td>
<td>5.5</td>
</tr>
</tbody>
</table>

*As feed basis
**As dry matter basis

Procedure of sampling

Sampling was performed at seven days interval. Ten fry were caught from each bowl by the scope net. Then length (mm) and weight (mg) were recorded by a graph-paper attached petridish and an electric balance (Model no. Mettler Toledo PB 303 Delta range) respectively.

Analysis of data

Analysis of variance (ANOVA) test supporting the principles of Completely Randomized Design was applied to compare the data obtained on growth among three treatments (Van 1972, Fundamentals of Biostatistics).

Results

The growth patterns of 5 days old *C. batrachus* larvae in terms of length and weight during the 28 days of experimental period are shown in Tables 2 and 3. The final weight of larvae under treatment I was significantly higher compared to that of treatment II while the final weight of larvae under treatment II was significantly higher than treatment III. Specific growth rate also showed the same sequence. Weight gain by the larvae of treatments II was significantly lower compared to those of treatment I and higher compared to those of treatment III (Table 3). Survival rate of the larvae were 92.25%, 94%, and 16% of three treatment (I, II and III) respectively. Survival rate (94%) of the larvae fed mixed feed (tubificid worms + starter 1) was similar to those fed only live feed (tubificid worms) and significantly better than those reared only on artificial feed.
Table 2. Mean growth of *Clarias batrachus* larvae in terms of length (mm) and weight (mg) at different times of the experimental period

<table>
<thead>
<tr>
<th>Sampling Days</th>
<th>Treatment I</th>
<th>Treatment II</th>
<th>Treatment III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Length (mm)</td>
<td>Weight (mg)</td>
<td>Length (mm)</td>
</tr>
<tr>
<td>0</td>
<td>8.9 ± 0.99</td>
<td>3.7 ± 1.15</td>
<td>8.9 ± 0.99</td>
</tr>
<tr>
<td>7</td>
<td>18.51 ± 0.40</td>
<td>201.2 ± 5.8</td>
<td>15.83 ± 0.23</td>
</tr>
<tr>
<td>14</td>
<td>28.3 ± 0.19</td>
<td>404.2 ± 10.4</td>
<td>22.9 ± 0.36</td>
</tr>
<tr>
<td>21</td>
<td>37.7 ± 0.16</td>
<td>599.4 ± 14.5</td>
<td>29.85 ± 0.54</td>
</tr>
<tr>
<td>28</td>
<td>47.63 ± 1.52</td>
<td>796.8 ± 68.06</td>
<td>37.37 ± 2.14</td>
</tr>
</tbody>
</table>

Table 3. Growth performance of *Clarias batrachus* larvae in different diets

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Tubificid worms</th>
<th>Tubificed worms + Starter 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial weight (mg)</td>
<td>3.7&lt;sup&gt;a2&lt;/sup&gt;</td>
<td>3.7&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Final weight (mg)</td>
<td>796.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>403.9&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Initial length (mm)</td>
<td>8.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>8.9&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Final length (mm)</td>
<td>47.6&lt;sup&gt;a&lt;/sup&gt;</td>
<td>37.4&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Weight gain</td>
<td>793.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>400.2&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Specific growth rate (SGR% day)</td>
<td>19.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>16.7&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Survival rate (%)</td>
<td>92.3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>94.0&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

1 Standard error of treatment mean calculated from the residual mean square in the analysis of variance.
2 Figures in the same row having the same superscripts are not significantly different (P>0.05).

**Discussion**

In the present study best growth rate of *C. batrachus* larvae was obtained with live feed (treatment 1). On the other hand, larvae fed starter-1 only showed very poor growth and survival. Mollah and Nurullah (1988) successfully reared *C. batrachus* larvae with live feed (*Tubifex* spp.) in rearing the fry of *C. batrachus* in aquaria using supplemental feed during the first four weeks of life with live *Artemia salina* nauplii, zooplankton in live and frozen forms and with artificial feed, live *Artemia salina* nauplii was proved the best (Bairage et al. 1988). Fermin and Bolivar (1991) reported that the specific growth rate of *C.*
macrophalus after 14 days rearing period was higher for fish fed Artemia plus a dry feed than for other treatment groups fed either live zooplankton or a dry feed than for other treatment groups feed alone. C. macrocephalus larvae could directly take dry feed during the early day of exogenous feeding. However, continued feeding on dry artificial feed resulted in poor fish growth and survival. Similar was the case in the present study where 16% survival was recorded in the larvae fed only artificial feed compared to 94% and 92.25% for those fed live plus artificial and only live feed. Alam and Mollah (1988) reported C. batrachus larvae fed on live feed (Tubifex spp.) exhibiting significantly superior growth than artificial feeds. However, the survival rate (80.2%) obtained with artificial feed containing 56% fish meal, 19% baker's yeast and 14% wheat flour was comparable to those feed on Tubifex spp. (91.5%). Kestemont and Statmans (1992) reported best survival rate, growth and feed utilization of Phoxinus phoxinus larvae when reared with the frozen Artemia nauplii or mixed diet (50% Artemia and 50% dry feed). From an initial body weight of 1.86 mg at hatching, phoxinus phoxinus larvae reached about 30 mg in 4 weeks time and survival rate was higher than 96%. On the other hand, the dry feed was not suitable for the Phoxinus phoxinus larvae and mortality increases. According to Hirano and Hanyu (1990) all developmental stages of C. gariepinus can adopt to dry compound feeds. The best growth was, however, obtained for fish fed on Artemia.

Conclusions

It is clear from the result of present study and the discussion made so far that C. batrachus larvae can be reared successfully with live feed while artificial feeds give poor growth and very fluctuating survival rates. So, the question is how these larvae can be weaned gradually to an artificial diet keeping the growth and survival rates in the acceptable range. This is of tremendous importance from catfish larvae culture viewpoint. Therefore, further study under the appropriate experimental design to wean the C. batrachus larvae to the artificial feed needs to be conducted.
References


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